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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/395,490	09/14/1999	ROBERT EVEREST JOHNSON	LUT-2-0023	6096

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EXAMINER

BURD, KEVIN MICHAEL

ART UNIT	PAPER NUMBER
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2631

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/395,490

Applicant(s)

JOHNSON ET AL.

Examiner

Kevin M. Burd

Art Unit

2631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 and 30-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-13, 15-25, 27, 28 and 30-34 is/are rejected.
- 7) ☒ Claim(s) 6, 14 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. This office action, in response to the request for continued examination and amendment filed 3/9/2005, is a non-final office action.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/9/2005 has been entered.

Response to Amendment

3. No amendment or discussion was provided regarding the previous rejections claims 16, 27 and 28. Therefore, the previous rejections of these claims are maintained and restated below. New rejections for claims 1-5, 7-13, 15, 17-25 and 30-34, necessitated by the amendment, are stated below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the

invention by the applicant for patent, except that an international application filed under treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 16, 27 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Leyendecker et al (US 5,923,712).

Regarding claims 16, 27 and 28, Leyendecker discloses an apparatus and method for adaptively predistorting a baseband signal (figure 4). The predistorter 407 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 103. The predistorted 800 ksps component signals from the predistorter 407 are received by the digital interpolator 409 (column 7, line 50 to column 8, line 5). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 56-58). The interpolator filters the upsampled base band signal (column 8, lines 2-4). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. Leyendecker further discloses using the input I and Q signal to retrieve information from a look-up table (column 10, lines 35-58 and figure 6). The output signal is based on the information from the look-up table since the look-up table determines the predistortion that takes place. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 431 (figure 4). The trainer provides input signal to the look-up table (figure 6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2631

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 8-12, 15, 18, 19, 22-24, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543) further in view of Perkins et al (US 5,963,549).

Regarding claim 1, 9, 12, 18, 19, 22, 24, 31 and 32, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics

of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

The combination of Jones and Shin does not disclose clipping the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above.

Regarding claims 2 and 10, Jones discloses upconverting the 800 ksps signals to 3.2 Msps signal (column 7, lines 30-45).

Regarding claims 3, 11 and 23, Perkins discloses the I and Q components are summed prior to recovering lookup table information (column 2, lines 30-44).

Regarding claims 8 and 15, the signal is delayed by elements 112, 113 and 115 prior to being output of the system (Jones figure 2).

6. Claims 4, 5, 7, 13, 20, 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543)

further in view of Perkins et al (US 5,963,549) as applied to claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 27-29, 31 and 32 above, and further in view of Miyashita (US 6,288,610).

Regarding claims 4, 5, 7, 13, 20, 25 and 33, the combination of Jones, Shin and Perkins disclose an apparatus and method for adaptively predistorting a baseband signal as stated above. The combination does not disclose using the lookup table technique to predistort the baseband signal where the distortion characteristics are defined by polynomial equations having coefficients. Miyashita discloses the predistortion characteristics are defined by the polynomial equation shown in column 4, lines 60-68. The equation $g(x)$ is the expression of the envelope transfer function. It would have been obvious to incorporate the method of using a polynomial equation from a look up table to predistort a baseband signal as disclosed in Miyashita into the combination to correct distortion impairing linearity which occurs in the amplifier (column 3, lines 31-33).

7. Claims 17, 21, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Shin et al (US 6,493,543)

Regarding claims 17, 21, 30 and 34, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase the sampling (column 7,

lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Jones does not disclose the receiver being tuned to at least one specific frequency offset from a carrier frequency of the output signal. Shin discloses the control system 104 measures the energy of the distortion frequency components by measuring energy at a frequency or frequency offset from a carrier frequency. The feedback control signal on line 109 is coupled to the predistorter 105 for adjusting characteristics of the predistorter and thereby null the energy in the out-of-band signals on line 103 (column 5, lines 33-45). It would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the teachings of Shin into the apparatus and method of Jones to measure the energy of distortion frequency components and to remove out-of-band signals. This would remove noise from the signal to be transmitted and allow error free transmissions to be sent to the receiver.

Allowable Subject Matter

8. Claims 6, 14 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Thursday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kevin M. Burd
3/31/2005

KEVIN BURD
PRIMARY EXAMINER